

Claims

What is claimed is:

5 1. A method for making a diamond tool comprising the steps of:

a) providing a mold having a diamond interface surface configuration which inversely corresponds to a desired shape for a working surface of the tool;

10 b) coating said diamond interface surface with diamond using a chemical vapor deposition (CVD) technique to form a diamond layer; and

c) separating the mold from the diamond layer;
such that the resultant diamond layer has a working surface which inversely corresponds to the diamond interface surface
15 configuration of the mold.

2. The method of claim 1, wherein said mold comprises a metal material.

20 3. The method of claim 2, wherein said metal material is a member selected from the group consisting of tungsten, molybdenum, tantalum, zirconium, vanadium, chromium, carbides thereof, copper, and mixtures thereof.

4. The method of claim 1, wherein said diamond interface surface is smooth.

5. The method of claim 1, wherein said diamond interface surface is rough.

6. The method of claim 1, wherein said diamond interface surface has a concave configuration.

7. The method of claim 1, wherein said diamond interface surface has a convex configuration.

8. The method of claim 1, wherein said diamond interface surface configuration inversely corresponds to the shape of a drawing dye.

9. The method of claim 8, wherein said drawing dye has a channel with a non-spherical shape.

10. The method of claim 1, wherein said diamond interface surface configuration inversely corresponds to the shape of a chemical mechanical polishing (CMP) pad dresser.

11. The method of claim 1, wherein said diamond interface

surface configuration inversely corresponds to the shape of a pipe.

5 12. The method of claim 1, wherein said diamond interface surface configuration inversely corresponds to the shape of a diaphragm.

10 13. The method of claim 1, wherein said diamond interface surface configuration inversely corresponds to the shape of a cutting element.

14. The method of claim 13, wherein said cutting element contains chip breakers.

15 15. The method of claim 1, wherein said diamond layer has a thickness of from about 20 microns to about 200 microns.

20 16. The method of claim 1, further comprising the step of increasing the thickness of said diamond layer to a desired thickness, using a non-chemical vapor deposition process.

17. The method of claim 1, wherein said CVD technique is a member selected from the group consisting of: hot filament, microwave plasma, oxyacetylene flame, and arc jet techniques.

18. The method of claim 17, wherein said CVD technique utilizes a combination of methane and hydrogen gasses.

19. The method of claim 1, wherein step c) is accomplished by
5 chemically removing the mold from the diamond layer.

20. The method of claim 1, further comprising the step of attaching said diamond layer to a non-diamond material for incorporation into a tool.

10 21. A diamond tool formed by the process comprising the steps of:

a) providing a mold having a diamond interface surface configuration which inversely corresponds to a desired shape
15 for a working surface of the tool;

b) coating said diamond interface surface with diamond using a chemical vapor deposition (CVD) technique to form a diamond layer; and

c) separating the mold from the diamond layer;
20 such that the resultant diamond layer has a working surface which inversely corresponds to the diamond interface surface configuration of the mold.

22. The diamond tool of claim 21, wherein said mold comprises

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a metal material.

23. The diamond tool of claim 22, wherein said metal material is a member selected from the group consisting of tungsten, molybdenum, tantalum, zirconium, vanadium, chromium, carbides thereof, copper, and mixtures thereof.

24. The diamond tool of claim 21, wherein said diamond interface surface is smooth.

25. The diamond tool of claim 21, wherein said diamond interface surface is rough.

26. The diamond tool of claim 21, wherein said diamond interface surface has a concave configuration.

27. The diamond tool of claim 21, wherein said diamond interface surface has a convex configuration.

28. The diamond tool of claim 21, wherein said diamond interface surface configuration inversely corresponds to the shape of a drawing dye.

29. The diamond tool of claim 28, wherein said drawing dye

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has a channel with a non-spherical shape.

30. The diamond tool of claim 21, wherein said diamond
interface surface configuration inversely corresponds to the
5 shape of a chemical mechanical polishing (CMP) pad dresser.

31. The diamond tool of claim 21, wherein said diamond
interface surface configuration inversely corresponds to the
10 shape of a pipe.

32. The diamond tool of claim 21, wherein said diamond
interface surface configuration inversely corresponds to the
shape of a diaphragm.

15 33. The diamond tool of claim 21, wherein said diamond
interface surface configuration inversely corresponds to the
shape of a cutting element.

20 34. The diamond tool of claim 33, wherein said cutting
element contains chip breakers.

35. The diamond tool of claim 21, wherein said diamond layer
has a thickness of from about 20 microns to about 200

microns.

36. The diamond tool of claim 21, further comprising the step of increasing the thickness of said diamond layer to a desired thickness, using a non-chemical vapor deposition process.

37. The diamond tool of claim 21, wherein said CVD technique is a member selected from the group consisting of: hot filament, microwave plasma, oxyacetylene flame, and arc jet techniques.

38. The diamond tool of claim 37, wherein said CVD technique utilizes a combination of methane and hydrogen gasses.

39. The diamond tool of claim 21, wherein step c) is accomplished by chemically removing the mold from the diamond layer.

40. The diamond tool of claim 21, further comprising the step of attaching said diamond layer to a non-diamond material for incorporation into a tool.

41. A diamond tool comprising:

a) a diamond layer having working surface with a shape

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which inversely corresponds to the configuration of a diamond interface surface in an ephemeral mold, upon which said diamond layer is deposited; and

b) a non-diamond layer joined to the diamond layer.

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42. The diamond tool of claim 41, wherein said working surface is smooth.

43. The diamond tool of claim 41, wherein said working surface is rough.

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44. The diamond tool of claim 41, wherein said working surface has a concave configuration.

45. The diamond tool of claim 41, wherein said working surface has a convex configuration.

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46. The diamond tool of claim 41, wherein said tool is a drawing dye.

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47. The diamond tool of claim 46, wherein said drawing dye has a channel with a non-spherical shape.

48. The diamond tool of claim 41, wherein said tool is a

chemical mechanical polishing (CMP) pad dresser.

49. The diamond tool of claim 41, wherein said tool is a pipe water jet nozzle.

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50. The diamond tool of claim 41, wherein said diamond tool is a diaphragm.

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51. The diamond tool of claim 41, wherein said tool is a cutting element.

52. The diamond tool of claim 51, wherein said cutting element contains chip breakers.

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53. The diamond tool of claim 41, wherein said diamond layer has a thickness of from about 20 microns to about 200 microns.

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54. The diamond tool of claim 41, said diamond layer is comprises both diamond deposited using a CVD technique, and diamond which was not deposited using a CVD technique.

55. The method of claim 1, wherein said diamond interface surface is not subjected to mechanical finishing.

56. The method of claim 1, wherein said diamond working surface is essential free of micro cracks.

57. The method of claim 1, wherein said diamond interface surface configuration inversely corresponds to the shape of an extruding dye.

58. The method of claim 11, wherein said diamond pipe is a water jet nozzle.

59. The method of claim 12, wherein said diamond diaphragm is a tweeter diaphragm.

60. The method of claim 13, wherein said cutting element is an insert.

61. The method of claim 21, wherein said diamond interface surface configuration inversely corresponds to the shape of an extruding dye.

62. The method of claim 31, wherein said diamond pipe is a water jet nozzle.

63. The method of claim 32, wherein said diamond diaphragm is

a tweeter diaphragm.

64. The method of claim 33, wherein said cutting element is an insert.